

## **KEI (MAINE) Power Management (III) LLC**

December 19, 2014

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PUBLIC UTILITIES COMMISSION  
2014 DEC 22 AM 11:37

Ms. Luly E. Massaro, Commission Clerk  
Rhode Island Public Utilities Commission  
89 Jefferson Boulevard  
Warwick, RI 02888

**SUBJECT: KEI (Maine) Power Management (III) LLC's Application for Eligibility of Barker Mills Lower Project as a New Renewable Energy Resource**

Dear Ms. Massaro,

KEI (Maine) Power Management (III) LLC ("KEI") hereby respectfully requests that the State of Rhode Island Public Utilities Commission issue a declaratory judgment on the eligibility of KEI's Barker Mills Lower Project (the "Project") as a New Renewable Energy Resource pursuant to the Renewable Energy Act §39-26-1 *et. seq.* of the General Laws of Rhode Island.

The Project is a Run-of-River facility that has a nameplate capacity of 1.5 MW and that does not cause any appreciable change in the river flow. In the coming year, major investments are planned that will significantly increase the efficiency of the Project. These investments are necessary in order to remediate the existing turbine's poor efficiency. Please find attached KEI's application seeking a declaratory judgment for eligibility as a "repowered" renewable energy resource in the State of Rhode Island.

The Lower Barker Hydroelectric facility is located in Maine, in the NEPOOL control area.

As a supplement to KEI's application we are attaching, for public record, a redacted version of the Project's expected capital investments and book value. KEI has submitted a Motion for Protective Treatment under separate cover along with a copy of the confidential attachment to the Commission pending a determination on the KEI's Motion.

KEI would like to make clear that Mr. Stéphane Cohen and Mr. Gilles Côté are authorized to answer requests for information on behalf of KEI and that they have accurate knowledge in regards to the above mentioned project.

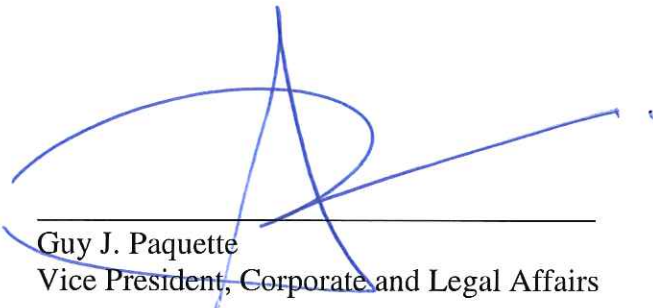
Additional confidential material to be provided is subject to protective treatment.

## ***KEI (MAINE) Power Management (III) LLC***

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Thank you for your consideration of KEI's request. If you have any questions or need additional information, please contact:

Stéphane Cohen  
KEI (Maine) Power Management (III), LLC  
c/o Kruger Energy Inc.  
3285 chemin Bedford  
Montreal, Québec  
H3S 1G5  
E-mail: [stéphane.cohen@kruger.com](mailto:stéphane.cohen@kruger.com)  
Tel : 514-343-3100 ext. 12109



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Guy J. Paquette  
Vice President, Corporate and Legal Affairs

**RIPUC Use Only**

Date Application Received: \_\_\_/\_\_\_/\_\_\_  
Date Review Completed: \_\_\_/\_\_\_/\_\_\_  
Date Commission Action: \_\_\_/\_\_\_/\_\_\_  
Date Commission Approved: \_\_\_/\_\_\_/\_\_\_

GIS Certification #:  
\_\_\_\_\_**RENEWABLE ENERGY RESOURCES ELIGIBILITY FORM****The Standard Application Form**

**Required of all Applicants for Certification of Eligibility of Renewable Energy Resource  
(Version 8 – December 5, 2012)**

**STATE OF RHODE ISLAND PUBLIC UTILITIES COMMISSION****Pursuant to the Renewable Energy Act****Section 39-26-1 et. seq. of the General Laws of Rhode Island****NOTICE:**

When completing this Renewable Energy Resources Eligibility Form and any applicable Appendices, please refer to the State of Rhode Island and Providence Plantations Public Utilities Commission Rules and Regulations Governing the Implementation of a Renewable Energy Standard (RES Regulations, Effective Date: January 1, 2006), and the associated RES Certification Filing Methodology Guide. All applicable regulations, procedures and guidelines are available on the Commission's web site: [www.ripuc.org/utilityinfo/res.html](http://www.ripuc.org/utilityinfo/res.html). Also, all filings must be in conformance with the Commission's Rules of Practice and Procedure, in particular, Rule 1.5, or its successor regulation, entitled "Formal Requirements as to Filings."

- Please complete the Renewable Energy Resources Eligibility Form and Appendices using a typewriter or black ink.
- Please submit one original and three copies of the completed Application Form, applicable Appendices and all supporting documentation to the Commission at the following address:  
Rhode Island Public Utilities Commission  
Attn: Luly E. Massaro, Commission Clerk  
89 Jefferson Blvd  
Warwick, RI 02888

In addition to the paper copies, electronic/email submittals are required under Commission regulations. Such electronic submittals should be sent to [res@puc.state.ri.us](mailto:res@puc.state.ri.us).

- In addition to filing with the Commission, Applicants are required to send, electronically or electronically and in paper format, a copy of the completed Application including all attachments and supporting documentation, to the Division of Public Utilities and Carriers and to all interested parties. A list of interested parties can be obtained from the Commission's website at [www.ripuc.org/utilityinfo/res.html](http://www.ripuc.org/utilityinfo/res.html).
- Keep a copy of the completed Application for your records.
- The Commission will notify the Authorized Representative if the Application is incomplete.
- Pursuant to Section 6.0 of the RES Regulations, the Commission shall provide a thirty (30) day period for public comment following posting of any administratively complete Application.
- Please note that all information submitted on or attached to the Application is considered to be a public record unless the Commission agrees to deem some portion of the application confidential after consideration under section 1.2(g) of the Commission's Rules of Practice and Procedure.
- In accordance with Section 6.2 of the RES Regulations, the Commission will provide prospective reviews for Applicants seeking a preliminary determination as to whether a facility would be eligible prior to the formal certification process described in Section 6.1 of the RES Regulations. Please note that space is provided on the Form for applicant to designate the type of review being requested.
- Questions related to this Renewable Energy Resources Eligibility Form should be submitted in writing, preferably via email and directed to: Luly E. Massaro, Commission Clerk at [res@puc.state.ri.us](mailto:res@puc.state.ri.us).

## SECTION I: Identification Information

- 1.1 Name of Generation Unit (sufficient for full and unique identification):  
**Barker Mills Lower Project**
- 1.2 Type of Certification being requested (check one):  
☐ Standard Certification     ☒ Prospective Certification (Declaratory Judgment)
- 1.3 This Application includes: (Check all that apply)<sup>1</sup>
- ☐ APPENDIX A: Authorized Representative Certification for Individual Owner or Operator
- ☐ APPENDIX B: Authorized Representative Certification for Non-Corporate Entities Other Than Individuals
- ☒ APPENDIX C: Existing Renewable Energy Resources
- ☐ APPENDIX D: Special Provisions for Aggregators of Customer-sited or Off-grid Generation Facilities
- ☐ APPENDIX E: Special Provisions for a Generation Unit Located in a Control Area Adjacent to NEPOOL
- ☐ APPENDIX F: Fuel Source Plan for Eligible Biomass Fuels
- 1.4 Primary Contact Person name and title:  
**Stephane Cohen, Jr. Engineer**
- 1.5 Primary Contact Person address and contact information:  
Address: **c/o Kruger Energy Inc., 3285 chemin Bedford, Montreal, Québec, H3S 1G5**  
Phone: **514-343-3100 #2109**     Fax: **(514) 343-3124**  
Email: stephane.cohen@kruger.com
- 1.6 Backup Contact Person name and title:  
**Gilles Cote, Manager Sustainable Development**
- 1.7 Backup Contact Person address and contact information:  
Address: **c/o Kruger Energy Inc., 3285 chemin Bedford, Montreal, Quebec, H3S 1G5**  
**CANADA**  
Phone: **(514) 343-3100 x 2011**     Fax: **(514) 343-3124**  
Email: Gilles.Cote@kruger.com

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<sup>1</sup> Please note that all Applicants are required to complete the Renewable Energy Resources Eligibility Standard Application Form and all of the Appendices that apply to the Generation Unit or Owner or Operator that is the subject of this Form. Please omit Appendices that do not apply.

- 1.8 Name and Title of Authorized Representative (*i.e.*, the individual responsible for certifying the accuracy of all information contained in this form and associated appendices, and whose signature will appear on the application):

**Guy Paquette, Vice President, Corporate and Legal Affairs**

Appendix A or B (as appropriate) completed and attached? ☐ Yes ☒ No ☐ N/A

- 1.9 Authorized Representative address and contact information:

Address: **3285 chemin Bedford, Montreal, Quebec, H3S 1G5 CANADA**

Phone: **(514) 343-3247** Fax: **(514) 343-3124**

Email: Guy.Paquette@kruger.com

- 1.10 Owner name and title:

**KEI (Maine) Power Management (III) LLC**

- 1.11 Owner address and contact information:

Address: **37 Alfred A. Plourde Parkway, Suite 2, Lewiston, ME 04240**

Phone: **(207) 786-8834** Fax: **(207) 786-8812**

- 1.12 Owner business organization type (check one):

- ☐ Individual  
☐ Partnership  
☒ Corporation  
☐ Other:

- 1.12 Operator name and title:

**Lewis C. Loon, Operations and Maintenance Manager – USA, Kruger Energy Inc.**

- 1.14 Operator address and contact information:

Address: **37 Alfred A. Plourde Parkway, Suite 2, Lewiston, ME 04240**

Phone: **(207) 786-8834** Fax: **(207) 786-8812**

Email: Lewis.Loan@kruger.com

- 1.15 Operator business organization type (check one):

- ☐ Individual  
☐ Partnership  
☒ Corporation  
☐ Other:

## SECTION II: Generation Unit Information, Fuels, Energy Resources and Technologies

- 2.1 ISO-NE Generation Unit Asset Identification Number or NEPOOL GIS Identification Number (either or both as applicable): Asset ID #2278 GIS ID# MSS2278
- 2.2 Generation Unit Nameplate Capacity: 1.5 MW
- 2.3 Maximum Demonstrated Capacity: 1.2 MW
- 2.4 Please indicate which of the following Eligible Renewable Energy Resources are used by the Generation Unit: (Check ALL that apply) – *per RES Regulations Section 5.0*
- ☐ Direct solar radiation
  - ☐ The wind
  - ☐ Movement of or the latent heat of the ocean
  - ☐ The heat of the earth
  - ☒ Small hydro facilities
  - ☐ Biomass facilities using Eligible Biomass Fuels and maintaining compliance with all aspects of current air permits; Eligible Biomass Fuels may be co-fired with fossil fuels, provided that only the renewable energy fraction of production from multi-fuel facilities shall be considered eligible.
  - ☐ Biomass facilities using unlisted biomass fuel
  - ☐ Biomass facilities, multi-fueled or using fossil fuel co-firing
  - ☐ Fuel cells using a renewable resource referenced in this section
- 2.5 If the box checked in Section 2.4 above is “Small hydro facilities”, please certify that the facility’s aggregate capacity does not exceed 30 MW. – *per RES Regulations Section 3.32*
- ☒ ← check this box to certify that the above statement is true
- ☐ N/A or other (please explain) \_\_\_\_\_
- 2.6 If the box checked in Section 2.4 above is “Small hydro facilities”, please certify that the facility does not involve any new impoundment or diversion of water with an average salinity of twenty (20) parts per thousand or less. – *per RES Regulations Section 3.32*
- ☒ ← check this box to certify that the above statement is true
- ☐ N/A or other (please explain) \_\_\_\_\_
- 2.7 If you checked one of the Biomass facilities boxes in Section 2.4 above, please respond to the following:
- A. Please specify the fuel or fuels used or to be used in the Unit:
- B. Please complete and attach Appendix F, Eligible Biomass Fuel Source Plan.
- Appendix F completed and attached? ☐ Yes ☐ No ☐ N/A

- 2.8 Has the Generation Unit been certified as a Renewable Energy Resource for eligibility in another state's renewable portfolio standard?

☒ Yes ☐ No If yes, please attach a copy of that state's certifying order.

Copy of State's certifying order attached? See Attachment 2 ☒ Yes ☐ No ☐ N/A

### SECTION III: Commercial Operation Date

Please provide documentation to support all claims and responses to the following questions:

- 3.1 Date Generation Unit first entered Commercial Operation: December 1980

If the commercial operation date is after December 31, 1997, please provide independent verification, such as the utility log or metering data, showing that the meter first spun after December 31, 1997. This is needed in order to verify that the facility qualifies as a New Renewable Energy Resource.

Documentation attached? ☐ Yes ☐ No ☒ N/A

- 3.2 Is there an Existing Renewable Energy Resource located at the site of Generation Unit?

☒ Yes

☐ No

- 3.3 If the date entered in response to question 3.1 is earlier than December 31, 1997 or if you checked "Yes" in response to question 3.2 above, please complete Appendix C.

Appendix C completed and attached? ☒ Yes ☐ No ☐ N/A

- 3.4 Was all or any part of the Generation Unit used on or before December 31, 1997 to generate electricity at any other site?

☐ Yes

☒ No

- 3.5 If you checked "Yes" to question 3.4 above, please specify the power production equipment used and the address where such power production equipment produced electricity (attach more detail if the space provided is not sufficient):

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### SECTION IV: Metering

- 4.1 Please indicate how the Generation Unit's electrical energy output is verified (check all that apply):

☒ ISO-NE Market Settlement System

☐ Self-reported to the NEPOOL GIS Administrator

☐ Other (please specify below and see Appendix D: Eligibility for Aggregations):

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Appendix D completed and attached?

☐ Yes ☐ No ☐ N/A

## SECTION V: Location

5.1 Please check one of the following that apply to the Generation Unit:

☒ Grid Connected Generation

☐ Off-Grid Generation (not connected to a utility transmission or distribution system)

☐ Customer Sited Generation (interconnected on the end-use customer side of the retail electricity meter in such a manner that it displaces all or part of the metered consumption of the end-use customer)

5.2 Generation Unit address:

**119 Mill Street, Auburn, ME 04210**

5.3 Please provide the Generation Unit's geographic location information:

A. Universal Transverse Mercator Coordinates: **44°05'16.7"N 70°13'35.1"W**

B. Longitude/Latitude: **Latitude: 44.087963 / Longitude: -70.226419**

5.4 The Generation Unit located: (please check the appropriate box)

☒ In the NEPOOL control area

☐ In a control area adjacent to the NEPOOL control area

☐ In a control area other than NEPOOL which is not adjacent to the NEPOOL control area ← *If you checked this box, then the generator does not qualify for the RI RES – therefore, please do not complete/submit this form.*

5.5 If you checked "In a control area adjacent to the NEPOOL control area" in Section 5.4 above, please complete Appendix E.

Appendix E completed and attached?

☐ Yes ☐ No ☒ N/A



## SECTION VI: Certification

- 6.1 Please attach documentation, using one of the applicable forms below, demonstrating the authority of the Authorized Representative indicated in Section 1.8 to certify and submit this Application.

### Corporations

If the Owner or Operator is a corporation, the Authorized Representative shall provide **either**:

- (a) Evidence of a board of directors vote granting authority to the Authorized Representative to execute the Renewable Energy Resources Eligibility Form, **or**
- (b) A certification from the Corporate Clerk or Secretary of the Corporation that the Authorized Representative is authorized to execute the Renewable Energy Resources Eligibility Form or is otherwise authorized to legally bind the corporation in like matters.

Evidence of Board Vote provided? ☐ Yes ☐ No ☒ N/A

Corporate Certification provided? ☒ Yes ☐ No ☐ N/A

### Individuals

If the Owner or Operator is an individual, that individual shall complete and attach APPENDIX A, or a similar form of certification from the Owner or Operator, duly notarized, that certifies that the Authorized Representative has authority to execute the Renewable Energy Resources Eligibility Form.

Appendix A completed and attached? ☐ Yes ☐ No ☐ N/A

### Non-Corporate Entities

(Proprietorships, Partnerships, Cooperatives, etc.) If the Owner or Operator is not an individual or a corporation, it shall complete and attach APPENDIX B or execute a resolution indicating that the Authorized Representative named in Section 1.8 has authority to execute the Renewable Energy Resources Eligibility Form or to otherwise legally bind the non-corporate entity in like matters.

Appendix B completed and attached? ☐ Yes ☐ No ☐ N/A

## 6.2 Authorized Representative Certification and Signature:

I hereby certify, under pains and penalties of perjury, that I have personally examined and am familiar with the information submitted herein and based upon my inquiry of those individuals immediately responsible for obtaining the information, I believe that the information is true, accurate and complete. I am aware that there are significant penalties, both civil and criminal, for submitting false information, including possible fines and punishment. My signature below certifies all information submitted on this Renewable Energy Resources Eligibility Form. The Renewable Energy Resources Eligibility Form includes the Standard Application Form and all required Appendices and attachments. I acknowledge that the Generation Unit is obligated to and will notify the Commission promptly in the event of a change in a generator's eligibility status (including, without limitation, the status of the air permits) and that when and if, in the Commission's opinion, after due consideration, there is a material change in the characteristics of a Generation Unit or its fuel stream that could alter its eligibility, such Generation Unit must be re-certified in accordance with Section 9.0 of the RES Regulations. I further acknowledge that the Generation Unit is obligated to and will file such quarterly or other reports as required by the Regulations and the Commission in its certification order. I understand that the Generation Unit will be immediately de-certified if it fails to file such reports.

Signature of Authorized Representative:

SIGNATURE:

Guy Paquette

Vice President, Corporate and Legal Affairs

DATE: December 19, 2014

GIS Certification #:

**APPENDIX A**  
**(Required When Owner or Operator is An Individual)**

**STATE OF RHODE ISLAND**  
**PUBLIC UTILITIES COMMISSION**

**RENEWABLE ENERGY RESOURCES ELIGIBILITY FORM**

**Pursuant to the Renewable Energy Act**  
**Section 39-26-1 et. seq. of the General Laws of Rhode Island**

I, \_\_\_\_\_, as Owner or Operator of the Generation Unit  
named in Section 1.1 of the attached Renewable Energy Resources Eligibility Form, under the  
pains and penalties of perjury, hereby certify that \_\_\_\_\_,  
named in Section 1.8 of the attached Application, is authorized to execute this Renewable  
Energy Resource Eligibility Form.

SIGNATURE:

DATE:

\_\_\_\_\_  
(Title)

State: \_\_\_\_\_

County: \_\_\_\_\_

(TO BE COMPLETED BY NOTARY) I, \_\_\_\_\_ as a  
notary public, certify that I witnessed the signature of the above named \_\_\_\_\_,  
and said individual verified his/her identity to me on this date: \_\_\_\_\_.

SIGNATURE:

My commission expires on: \_\_\_\_\_

NOTARY SEAL:

**APPENDIX B**  
**(Required When Owner or Operator is a Non-Corporate Entity**  
**Other Than An Individual)**

**STATE OF RHODE ISLAND**  
**PUBLIC UTILITIES COMMISSION**

**RENEWABLE ENERGY RESOURCES ELIGIBILITY FORM**

Pursuant to the Renewable Energy Act  
Section 39-26-1 et. seq. of the General Laws of Rhode Island

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**RESOLUTION OF AUTHORIZATION**

**Resolved:** that \_\_\_\_\_, named in  
Section 1.8 of the Renewable Energy Resources Eligibility Form as Authorized Representative,  
is authorized to execute the Application on the behalf of \_\_\_\_\_,  
the Owner or Operator of the Generation Unit named in section 1.1 of the Application.

SIGNATURE:

DATE:

\_\_\_\_\_  
\_\_\_\_\_

\_\_\_\_\_

State: \_\_\_\_\_

County: \_\_\_\_\_

(TO BE COMPLETED BY NOTARY) I, \_\_\_\_\_ as a  
notary public, certify that I witnessed the signature of the above named \_\_\_\_\_,  
and that said person stated that he/she is authorized to execute this resolution, and the individual  
verified his/her identity to me, on this date: \_\_\_\_\_.

SIGNATURE:

DATE:

\_\_\_\_\_

\_\_\_\_\_

My commission expires on: \_\_\_\_\_

NOTARY SEAL:

**APPENDIX C**  
**(Revised 6/11/10)**  
**(Required of all Applicants with Generation Units at the Site of Existing**  
**Renewable Energy Resources)**

**STATE OF RHODE ISLAND**  
**PUBLIC UTILITIES COMMISSION**

**RENEWABLE ENERGY RESOURCES ELIGIBILITY FORM**

**Pursuant to the Renewable Energy Act**  
**Section 39-26-1 et. seq. of the General Laws of Rhode Island**

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If the Generation Unit: (1) first entered into commercial operation before December 31, 1997; or (2) is located at the exact site of an Existing Renewable Energy Resource, please complete the following and attach documentation, as necessary to support all responses:

- C.1 Is the Generating Unit seeking certification, either in whole or in part, as a New Renewable Energy Resource? ☒ Yes ☐ No
- C.2 If you answered "Yes" to question C.1, please complete the remainder of Appendix C. If you answered "No" and are seeking certification entirely as an Existing Renewable Energy Resource, you do NOT need to complete the remainder of Appendix C.
- C.3 If an Existing Renewable Energy Resource is/was located at the site, has such Existing Renewable Energy Resource been retired and replaced with the new Generation Unit at the same site?  
**The existing unit will be retired and replaced later in 2015** ☐ Yes ☒ No
- C.4 Is the Generation Unit a Repowered Generation Unit (as defined in Section 3.29 of the RES Regulations) which uses Eligible Renewable Energy Resources and which first entered commercial operation after December 31, 1997 at the site of an existing Generation Unit? ☒ Yes ☐ No
- C.5 If you checked "Yes" to question C.4 above, please provide documentation to support that the entire output of the Repowered Generation Unit first entered commercial operation after December 31, 1997. **See Attachment 3**
- C.6 Is the Generation Unit a multi-fuel facility in which an Eligible Biomass Fuel is first co-fired with fossil fuels after December 31, 1997? ☐ Yes ☒ No

- C.7 If you checked “Yes” to question C.6 above, please provide documentation to support that the renewable energy fraction of the energy output first occurred after December 31, 1997.
- C.8 Is the Generation Unit an Existing Renewable Energy Resource other than an Intermittent Resource (as defined in Sections 3.10 and 3.15 of the RES Regulations)? ☐ Yes ☒ No
- C.9 If you checked “Yes” to question C.8 above, please attach evidence of completed capital investments after December 31, 1997 attributable to efficiency improvements or additions of capacity that are sufficient to, were intended to, and can be demonstrated to increase annual electricity output in excess of ten percent (10%). As specified in Section 3.23.v of the RES Regulations, the determination of incremental production shall not be based on any operational changes at such facility **not directly** associated with the efficiency improvements or additions of capacity.

Please provide the single proposed percentage of production to be deemed incremental, attributable to the efficiency improvements or additions of capacity placed in service after December 31, 1997. Please make this calculation by comparing actual electrical output over the three calendar years 1995-1997 (the “Historical Generation Baseline”) with the actual output following the improvements. The incremental production above the Historical Generation Baseline will be considered “New” generation for the purposes of RES. Please give the percentage of the facility’s total output that qualifies as such to be considered “New” generation.

- C.10 Is the Generating Unit an Existing Renewable Energy Resource that is an Intermittent Resource? ☒ Yes ☐ No
- C.11 If you checked “Yes” to question C.10 above, please attach evidence of completed capital investments after December 31, 1997 attributable to efficiency improvements or additions of capacity that are sufficient to, were intended to, and have demonstrated on a normalized basis to increase annual electricity output in excess of ten percent (10%). The determination of incremental production shall not be based on any operational changes at such facility **not directly** associated with the efficiency improvements or additions of capacity. In no event shall any production that would have existed during the Historical Generation Baseline period in the absence of the efficiency improvements or additions to capacity be considered incremental production. Please refer to Section 3.23.vi of the RES Regulations for further guidance. **See Attachment 3 for Capital Investments and Attachment 4 for Incremental Production**
- C.12 If you checked “Yes” to C.10, provide the single proposed percentage of production to be deemed incremental, attributable to the efficiency improvements or additions of capacity placed in service after December 31, 1997. The incremental production above the Historical Generation Baseline will be considered “New” generation for the purposes of RES. Please make this calculation by comparing actual monthly electrical output over the three calendar years 1995-1997 (the “Historical Generation Baseline”) with the actual output following the improvements on a normalized basis. Please provide back-up

information sufficient for the Commission to make a determination of this incremental production percentage.

For example, for small hydro facilities, please use historical river flow data to create a monthly normalized comparison (e.g. average MWh produced per cubic foot/second of river flow for each month) between actual output values post-improvements with the Historical Generation Baseline. For solar and wind facilities, please use historical solar irradiation, wind flow, or other applicable data to normalize the facility's current production against the Historical Generation Baseline. **See Attachment 4**

C.13 If you checked "no" to both C.3 and C.4 above, please complete the following:

- a. Was the Existing Renewable Energy Resource located at the exact site at any time during calendar years 1995 through 1997? ☐ Yes ☐ No
- b. If you checked "yes" in Subsection (a) above, please provide the Generation Unit Asset Identification Number and the average annual electrical production (MWhs) for the three calendar years 1995 through 1997, or for the first 36 months after the Commercial Operation Date if that date is after December 31, 1994, for each such Generation Unit.
- c. Please attach a copy of the derivation of the average provided in (b) above, along with documentation support (such as ISO reports) for the information provided in Subsection (b) above. Data must be consistent with quantities used for ISO Market Settlement System.

**APPENDIX D**  
**(Revised 6/11/10)**  
**(Required of Applicants Seeking Eligibility for Customer-Sited and/or Off-Grid Generation Facilities and Associated Aggregations)**

**STATE OF RHODE ISLAND**  
**PUBLIC UTILITIES COMMISSION**

**RENEWABLE ENERGY RESOURCES ELIGIBILITY FORM**

**Pursuant to the Renewable Energy Act**  
**Section 39-26-1 et. seq. of the General Laws of Rhode Island**

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Customer-sited and Off-grid Generation Facilities located in Rhode Island may be certified as an eligible resource if their NEPOOL GIS Certificates are created by way of an aggregation of Generation Units using the same generation technology, and so long as the aggregation is certified by the Commission. Please complete the following and attach documentation, as necessary to support all responses:

- D.1 Please identify the location(s) in Rhode Island of each Generation Unit that is interconnected on the End-use Customer's side of the retail electricity meter in such a manner that it displaces all or part of the metered consumption of the End-use Customer, or not connected to a utility transmission or distribution system.

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- D.2 Please attach proposed procedures under which the aggregate Generation Units will operate ("Aggregation Agreement"). In accordance with Section 6.8.(iii) of the RES Regulations, the proposed Aggregation Agreement shall contain the following information:

- (a) Name and contact information of the Aggregator Owner, to which these regulations and stipulations of certification shall apply, and who shall be the initial owner of any NEPOOL GIS Certifications so certified;
- (b) Name, contact information, and qualifications of the Verifier. Qualifications shall include any information the applicant believes will assist the Commission in determining that the Verifier will accurately and efficiently carry out its duties. After receipt of the application, the Commission may require additional evidence of qualifications;



- (c) A declaration of any and all business or financial relations between Aggregator Owner and Verifier, which the Commission will use to evaluate the independence of the Verifier.<sup>2</sup>
  - (c.1) The Aggregation Agreement shall include a statement indicating under what circumstances the Verifier would not be considered sufficiently independent of the individual Generation Unit, and that Generation Units not meeting this independence test would not be allowed to participate in the aggregation;
- (d) Type of technology that will be included in the aggregation, and statement that the aggregation will include only individual Generation Units that meet all the requirements of these regulations, for example physical location, vintage, etc. (All generators within the aggregation must be of the same technology and fuel type);
- (e) Proposed operating procedures for the aggregation, by which the Aggregation Owner shall ensure that individual Generation Units in the aggregation comply with all eligibility requirements and that the NEPOOL GIS Certificates created accurately represent generation;<sup>3</sup>
- (f) Description of how the Verifier will be compensated for its services by the aggregator. In no instances will an aggregation be certified in which the Verifier is compensated in a manner linked to the number of NEPOOL GIS Certificates created by the aggregation; and
- (g) Confirmation and a description of how, no less frequently than quarterly, the Verifier will directly enter into the NEPOOL GIS the quantity of energy production in the applicable time period from each Generation Unit in the aggregation. The entry of generation data by the Verifier must be through an interface designated for this purpose by the NEPOOL GIS and in accordance with NEPOOL GIS Operating Rules applicable to Third-Party Meter Readers, and to which the Aggregation Owner shall not have access<sup>4</sup>.

### D.3 Applicant must acknowledge that:

<sup>2</sup> Reasons for ruling that a Verifier is not sufficiently independent include, but are not limited to: i) If one entity owns, directly or indirectly, or if a natural person so owns, 10% or more of the voting stock or other equity interest in the other entity; ii) If 10% or more of the voting stock or other equity interests in both entities are owned, directly or indirectly, by the same entity or a natural person; or iii) If one entity is a natural person, and such entity or a member of such entity's immediate family is an officer, director, partner, employee or representative of the other entity.

<sup>3</sup> At a minimum, these procedures will: i) require a determination by the Aggregation Owner that the Generation Unit is in compliance with these Renewable Energy Standard regulations and the Aggregation Agreement as approved by the Commission, and an independent determination by the Verifier that the Generation Unit exists; ii) require a meter reading procedure that allows the Verifier to read meters on the Generation Units; meter readings may be manual or remote and via the aggregators own system or via an independent system, but in all cases shall comply with NEPOOL GIS Operating Rules regarding metering; iii) require confirmation that Verifier will be entering the quantity of energy production in to the NEPOOL GIS system as described in paragraph (g) for NEPOOL GIS to create NEPOOL GIS Certificates; and OL GIS Certificates; and ; iv) include a procedure for the Verifier to report to the Commission on the results of their verification process.

<sup>4</sup> Such generation data shall not include any generation data from previous time periods, except as provided for in this section. Output of less than one MWh by any single Generation Unit within the aggregation may be applied to the entire aggregation's generation, and generation of the aggregation less than one full MWh may be applied to the subsequent quarter in accordance with NEPOOL GIS Operating Rules.

- (a) any changes to or deviations from the Aggregation Agreement will be considered a change in generator status, and will require recertification by the Commission;

☐ ← please check this box to acknowledge this requirement

☐ N/A or other (please explain) \_\_\_\_\_

- (b) the Commission will be promptly notified of any changes to or deviations from the Aggregation Agreement; and

☐ ← please check this box to acknowledge this requirement

☐ N/A or other (please explain) \_\_\_\_\_

- (c) in the event that notice of such changes or deviations is not promptly given, all Generation Units in the aggregation may be de-certified.

☐ ← please check this box to acknowledge this requirement

☐ N/A or other (please explain) \_\_\_\_\_

D.4 Applicant must certify that:

If the Generation Unit (or aggregation of generation units) is a Customer-sited or Off-grid Generation Resource, as defined in Section 39-26-2.4 of the General Laws of Rhode Island and Section 3.26 of the RES Regulations, respectively, the associated Generation Attributes have not otherwise been, nor will be sold, retired, claimed or represented as part of electrical energy output or sales, or used to satisfy obligations in jurisdictions other than Rhode Island.

☐ ← please check this box to certify that this statement is true

☐ N/A or other (please explain) \_\_\_\_\_

**APPENDIX E**  
**(Revised 6/11/10)**

**(Required of all Applicants Located in a Control Area Adjacent to NEPOOL)**

**STATE OF RHODE ISLAND**  
**PUBLIC UTILITIES COMMISSION**

**RENEWABLE ENERGY RESOURCES ELIGIBILITY FORM**

**Pursuant to the Renewable Energy Act**  
**Section 39-26-1 et. seq. of the General Laws of Rhode Island**

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Please complete the following and attach documentation, as necessary to support all responses:

E.1 Please indicate in which Control Area adjacent to NEPOOL the Generation Unit is located:

- ☐ New York  
☐ Hydro Quebec  
☐ Maritimes (including Northern Maine Independent System Administrator)

E.2 Applicant must provide to the Commission by July 1<sup>st</sup> of each year assurances that the Generation Unit's New Renewable Energy Resources used for compliance with the Rhode Island's Renewable Energy Act during the previous Compliance Year have not otherwise been, nor will be, sold, retired, claimed or represented as part of electrical energy output or sales, or used to satisfy obligations in jurisdictions other than Rhode Island. Such assurances may consist of a report from a neighboring Generation Attribute accounting system or an affidavit from the Generation Unit.

- ☐ ← please check this box to acknowledge this requirement  
☐ N/A or other (please explain) \_\_\_\_\_
- 

E.3 Applicant must acknowledge and provide evidence to support that, in accordance with Section 5.1.(ii) of the RES Regulations, the Generation Attributes associated with the Generation Unit shall be applied to the Rhode Island Renewable Energy Standard only to the extent of the energy produced by the Generation Unit that is or will be actually delivered into NEPOOL for consumption by New England customers. Verification of the delivery of such energy from the Generation Unit into NEPOOL will be performed in accordance with subparagraphs (a), (b) and (c) of RES Regulations Section 5.1.(ii)

- ☐ ← please check this box to acknowledge this requirement.

- (a) Under subparagraph 5.1.(ii)(a), Applicant must verify that the energy produced by the Generation Unit is actually delivered into NEPOOL via “a unit-specific bilateral contract for the sale and delivery of such energy into NEPOOL”.

☐ ← please check this box to acknowledge the requirement for Applicant to provide ongoing evidence of one or more unit-specific bilateral contract(s) for all energy delivery into NEPOOL for which Applicant seeks RI RES certification, prior to creation of certificates in each quarter, and:

- i. Please describe the type of evidence to be provided to the GIS Administrator to demonstrate the existence of such unit-specific bilateral contract(s) for the sale and delivery of such energy into NEPOOL, including duration, quantity and counter-party in NEPOOL:

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(attach more detail if the space provided is not sufficient)

☐ N/A or other (please explain): 

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**APPENDIX F**  
**(Revised 6/11/10)**  
**Eligible Biomass Fuel Source Plan**  
**(Required of all Applicants Proposing to Use An Eligible Biomass Fuel)**

**STATE OF RHODE ISLAND PUBLIC UTILITIES COMMISSION**  
**Part of Application for Certificate of Eligibility**  
**RENEWABLE ENERGY RESOURCES ELIGIBILITY FORM**  
**Pursuant to the Renewable Energy Act**  
**Section 39-26-1 et. seq. of the General Laws of Rhode Island**

**Note to Applicants:** Please refer to the RES Certification Filing Methodology Guide posted on the Commission's web site ([www.ripuc.org/utilityinfo/res.html](http://www.ripuc.org/utilityinfo/res.html)) for information, templates and suggestions regarding the types and levels of detail appropriate for responses to specific application items requested below. Also, please see Section 6.9 of the RES Regulations for additional details on specific requirements.

The phrase "Eligible Biomass Fuel" (per RES Regulations Section 3.7) means fuel sources including brush, stumps, lumber ends and trimmings, wood pallets, bark, wood chips, shavings, slash, yard trimmings, site clearing waste, wood packaging, and other clean wood that is not mixed with other unsorted solid wastes<sup>5</sup>; agricultural waste, food and vegetative material; energy crops; landfill methane<sup>6</sup> or biogas<sup>7</sup>, provided that such gas is collected and conveyed directly to the Generation Unit without use of facilities used as common carriers of natural gas; or neat bio-diesel and other neat liquid fuels that are derived from such fuel sources.

In determining if an Eligible Biomass Generation Unit shall be certified, the Commission will consider if the fuel source plan can reasonably be expected to ensure that only Eligible Biomass Fuels will be used, and in the case of co-firing ensure that only that proportion of generation attributable to an Eligible Biomass Fuel be eligible. Certification will not be granted to those Generation Units with fuel source plans the Commission deems inadequate for these purposes.

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<sup>5</sup> Generation Units using wood sources other than those listed above may make application, as part of the required fuel source plan described in Section 6.9 of the RES Regulations, for the Commission to approve a particular wood source as "clean wood." The burden will be on the applicant to demonstrate that the wood source is at least as clean as those listed in the legislation. Wood sources containing resins, glues, laminates, paints, preservatives, or other treatments that would combust or off-gas, or mixed with any other material that would burn, melt, or create other residue aside from wood ash, will not be approved as clean wood.

<sup>6</sup> Landfill gas, which is an Eligible Biomass Fuel, means only that gas recovered from inside a landfill and resulting from the natural decomposition of waste, and that would otherwise be vented or flared as part of the landfill's normal operation if not used as a fuel source.

<sup>7</sup> Gas resulting from the anaerobic digestion of sewage or manure is considered to be a type of biogas, and therefore an Eligible Biomass Fuel that has been fully separated from the waste stream.

This Appendix must be attached to the front of Applicant's Fuel Source Plan required for Generating Units proposing to use an Eligible Biomass Fuel (per Section 6.9 of RES Regulations).

- F.1 The attached Fuel Source Plan includes a detailed description of the type of Eligible Biomass Fuel to be used at the Generation Unit.

Detailed description attached? ☐ Yes ☐ No ☐ N/A

Comments: \_\_\_\_\_  
\_\_\_\_\_

- F.2 If the proposed fuel is "other clean wood," the Fuel Source Plan should include any further substantiation to demonstrate why the fuel source should be considered as clean as those clean wood sources listed in the legislation.

Further substantiation attached? ☐ Yes ☐ No ☐ N/A

Comments: \_\_\_\_\_  
\_\_\_\_\_

- F.3 In the case of co-firing with ineligible fuels, the Fuel Source Plan must include a description of (a) how such co-firing will occur; (b) how the relative amounts of Eligible Biomass Fuel and ineligible fuel will be measured; and (c) how the eligible portion of generation output will be calculated. Such calculations shall be based on the energy content of all of the proposed fuels used.

Description attached? ☐ Yes ☐ No ☐ N/A

Comments: \_\_\_\_\_  
\_\_\_\_\_

- F.4 The Fuel Source Plan must provide a description of what measures will be taken to ensure that only the Eligible Biomass Fuel are used, examples of which may include: standard operating protocols or procedures that will be implemented at the Generation Unit, contracts with fuel suppliers, testing or sampling regimes.

Description provided? ☐ Yes ☐ No ☐ N/A

Comments: \_\_\_\_\_  
\_\_\_\_\_

- F.5 Please include in the Fuel Source Plan an acknowledgement that the fuels stored at or brought to the Generation Unit will only be either Eligible Biomass Fuels or fossil fuels used for co-firing and that Biomass Fuels not deemed eligible will not be allowed at the premises of the certified Generation Unit. And please check the following box to certify that this statement is true.

☐ ← check this box to certify that the above statement is true

☐ N/A or other (please explain) \_\_\_\_\_

- F.6 If the proposed fuel includes recycled wood waste, please submit documentation that such fuel meets the definition of Eligible Biomass Fuel and also meets material separation, storage, or handling standards acceptable to the Commission and furthermore consistent with the RES Regulations.

Documentation attached?

☐ Yes

☐ No

☐ N/A

Comments: \_\_\_\_\_

- F.7 Please certify that you will file all reports and other information necessary to enable the Commission to verify the on-going eligibility of the renewable energy generators pursuant to Section 6.3 of the RES Regulations. Specifically, RES Regulations Section 6.3(i) states that Renewable Energy Resources of the type that combust fuel to generate electricity must file quarterly reports due 60 days after the end of each quarter on the fuel stream used during the quarter. Instructions and filing documents for the quarterly reports can be found on the Commissions website or can be furnished upon request.

☐ ← check this box to certify that the above statement is true

☐ N/A or other (please explain) \_\_\_\_\_

- F.8 Please attach a copy of the Generation Unit's Valid Air Permit or equivalent authorization.

Valid Air Permit or equivalent attached?

☐ Yes

☐ No

☐ N/A

Comments: \_\_\_\_\_

- F.9 Effective date of Valid Air Permit or equivalent authorization:

\_\_\_\_ / \_\_\_\_ / \_\_\_\_

- F.10 State or jurisdiction issuing Valid Air Permit or equivalent authorization:

\_\_\_\_\_

**ATTACHMENT 1**

**State of Connecticut Decision on Qualification of Lower Barker as a Class II Renewable  
Energy Source**





# STATE OF CONNECTICUT

DEPARTMENT OF PUBLIC UTILITY CONTROL  
TEN FRANKLIN SQUARE  
NEW BRITAIN, CT 06051

**DOCKET NO. 03-12-79 APPLICATION OF RIDGEWOOD MAINE HYDRO  
PARTNERS, L.P. FOR QUALIFICATION OF LOWER  
BARKER HYDRO AS A CLASS II RENEWABLE ENERGY  
SOURCE**

November 23, 2005

By the following Commissioners:

Anne C. George  
Donald W. Downes  
John W. Betkoski, III

**DECISION**

## **I. INTRODUCTION**

### **A. SUMMARY**

In this Decision, the Department of Public Utility Control determines that the Lower Barker generating facility qualifies as a Class II renewable energy source as a run-of-river hydroelectric facility and assigns it Connecticut Renewable Portfolio Standard (RPS) Registration Number CT00069-03.

### **B. BACKGROUND OF THE PROCEEDING**

By application dated December 23, 2003, Ridgewood Maine Hydro Partners, L.P. (Ridgewood) requested that the Department of Public Utility Control (Department) determine that the Lower Barker Hydro (Lower Barker) generation facility qualifies as a Class II renewable energy source.

On February 7, 2005, the Department requested that Ridgewood submit additional information concerning the application. The requested information includes, but is not limited to: (1) documentation demonstrating that the Lower Barker is a run-of-the-river facility; (2) a description of the generating units located on this site and the total nameplate capacity; and (3) documentation indicating the began operation date.

By motion dated March 3, 2005, Ridgewood requested an extension of time to file by March 31, 2005. This motion for an extension of time was granted until March 31, 2005. By motion dated April 1, 2005, Ridgewood requested a second extension of time to file by April 15, 2005 and it was granted. By motion dated April 18, 2005, Ridgewood requested a third extension of time to file by May 1, 2005. The third motion for an extension of time to file by May 1, 2005, was denied by the Department.

On June 9, 2005, the Department gave notice to Ridgewood that the Department's certification of Lower Barker facility as a Class II renewable energy source and Lower Barker's Connecticut RPS Registration Number CT00069-03 may be subject to revocation.

### **C. CONDUCT OF THE PROCEEDING**

By Notice of Hearing to Revoke Connecticut Renewable Portfolio Standard Registration Numbers dated August 4, 2005, pursuant to §§ 4-182(a), 4-182(c), 16-1(a)(26) and (27) of the General Statutes of Connecticut (Conn. Gen. Stat.), the Department held a public hearing on this matter on September 22, 2005, at the offices of the Department, Ten Franklin Square, New Britain, Connecticut 06051. By Notice of Close of Hearing dated October 7, 2005, the Hearing was closed.

### **D. PARTICIPANTS IN THE PROCEEDING**

The Department recognized Ridgewood Maine Hydro Partners, L.P., c/o Ridgewood Power Management, LLC, 947 Linwood Avenue, New Jersey 07450, and

the Office of Consumer Counsel, Ten Franklin Square, New Britain, Connecticut 06051, as participants in this proceeding.

## II. DEPARTMENT ANALYSIS

Pursuant to Connecticut General Statutes (C.G.S.) §16-1(a)(27), as amended by Public Act 03-135, An Act Concerning Revisions to the Electric Restructuring Legislation, "Class II renewable energy source" includes energy derived from a run-of-the-river hydropower facility provided such facility has a generating capacity of not more than five megawatts, does not cause an appreciable change in the riverflow, and began operation prior to July 1, 2003.

In interpreting C.G.S. §16-1(a)(27), the Department determined that:

(1) "Facility" refers to an entire hydroelectric plant at a single site rather than a turbine generating unit within a hydroelectric plant;

(2) The "generating capacity of not more than five megawatts" refers to a hydroelectric facility's nameplate capacity, not its actual or average generation output;

(3) In order to qualify as "run-of-the-river," a hydroelectric facility must show a current FERC license or exemption that requires the facility to operate in run-of-river mode. In addition, a facility can qualify as a Class I or Class II renewable energy facility only to the extent that its FERC license or exemption requires run-of-river operation. Hydroelectric facilities that are not regulated by FERC will be required to show a FERC order or a court decision stating that FERC has no jurisdiction, or has declined to exercise jurisdiction, over such facility. In such cases, the hydroelectric facility must show that its operation allows the river inflow to equal outflow instantaneously and therefore, does not cause an appreciable change in the riverflow; and

(4) "Began operations" means (A) the date an existing facility with existing generation began commercial operation as shown in documentation from FERC; (B) the new date given to an abandoned or destroyed facility that comes back into operation as shown in its documentation from FERC or as determined by the Department; (C) the date upon which a facility changes operation from store and release to run-of-river as shown in documentation from FERC; or (D) the new date that incremental generation is in operation at an existing facility as shown in its documentation from FERC.

See Docket No. 04-02-07, DPUC Declaratory Ruling Concerning "Run-of-the-River Hydropower" as That Term is Used in the Definitions of Class I and Class II Renewable Energy Source in C.G.S. §16-1(a)(26) &(27).

The Department expanded the definition of a run-of-river facility to include those facilities that voluntarily operate in run-of-river mode and that can demonstrate that the operation does not cause an appreciable change in the river flow. See Docket No. 04-05-16. As provided in the application, Lower Barker is a hydroelectric facility located in Auburn, Maine. Lower Barker is currently owned by Ridgewood. According to its application, this facility has a nameplate capacity of 1.43 megawatts. Application, p. 2.

Lower Barker began commercial operation on December 1, 1980. Id. However, the FERC documentation submitted by Ridgewood was not specific on its current requirement to operate Lower Barker as a run-of-the-river facility.

In its FERC Order Issuing License (Minor), dated February 23, 1979 (FERC Order), it states that the project dam, constructed in 1874, was originally operated with a run-of-the-river water power facility. It also states that no power is being generated at this time. FERC Order, p. 1. Subsequently, the Department requested further information, including, but not limited to, documentation demonstrating that the Lower Barker is operating as a run-of-the-river facility. During the hearing, Ridgewood provided a FERC Notice of Application for License (Minor), issued August 16, 1978 (FERC Application), which states that this project would be operated as run-of-the-river. Late Filed Exhibit No. 1, Attachment 1. Ridgewood testified that the Lower Barker facility is operated in a run-of-river mode throughout the year. Tr. 9/22/05, p. 106. Additionally, Lower Barker also provided daily operating data and minimum flow reports for the months of January, 2004 through September, 2005. Late Filed Exhibit No. 1, Attachment 3 and Late Filed Exhibit No. 2.

Department review of the operating data and representations from Ridgewood that the facility presently operates in run-of-the-river mode, sufficiently establish that Lower Barker is operated as a run-of-the-river facility. Based on the foregoing, the Department determines that Lower Barker qualifies as a Class II renewable energy facility.

### **III. FINDINGS OF FACT**

1. Lower Barker is a hydroelectric generating facility located in Auburn, Maine.
2. Lower Barker is currently owned by Ridgewood Maine Hydro Partners, L.P.
3. Lower Barker has a nameplate capacity of 1.43 megawatts.
4. Lower Barker began commercial operation on December 1, 1980.
5. Under its FERC Application, Lower Barker is operated as run-of-the-river.
6. Lower Barker provided daily operating data and minimum flow reports for the months of January, 2004 through September, 2005.

### **IV. CONCLUSION**

Based on the evidence submitted, the Department finds that Lower Barker qualifies as a Class II renewable generation source pursuant to Connecticut General Statutes §16-1(a)(27).

The Department assigns each renewable generation source a unique Connecticut Renewable Portfolio Standard (RPS) registration number. Lower Barker's Connecticut RPS registration number is CT00069-03.

The Department's determination in this docket is based on the information submitted by Ridgewood. The Department may reverse its ruling or revoke the Applicant's registration if any material information provided by the Applicant proves to be false or misleading. The Department reminds Ridgewood that it is obligated to notify the Department within 10 days of any changes to any of the information it has provided to the Department.

**B. ORDER**

1. Ridgewood shall file quarterly affidavits affirming that Lower Barker operated in run-of-the-river mode for the previous calendar quarter and operational data reports depicting the daily pond level and generation output at the Lower Barker facility by the 20<sup>th</sup> day of each month following a complete calendar quarter.

**DOCKET NO. 03-12-79 APPLICATION OF RIDGEWOOD MAINE HYDRO  
PARTNERS, L.P. FOR QUALIFICATION OF LOWER  
BARKER HYDRO AS A CLASS II RENEWABLE ENERGY  
SOURCE**

This Decision is adopted by the following Commissioners:

Anne C. George

Donald W. Downes

John W. Betkoski, III

CERTIFICATE OF SERVICE

The foregoing is a true and correct copy of the Decision issued by the Department of Public Utility Control, State of Connecticut, and was forwarded by Certified Mail to all parties of record in this proceeding on the date indicated.

*Louise E. Rickard*

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Louise E. Rickard  
Acting Executive Secretary  
Department of Public Utility Control

Nov. 28, 2005

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Date

**ATTACHMENT 2**

**Certification of Authority to sign the Renewable Eligibility Form**

## ***KEI (MAINE) Power Management (III) LLC***

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### **SECRETARY'S CERTIFICATE**

I, the undersigned, Janet Shulist, hereby certify that:

1. I am the Secretary of KEI (Maine) Power Management (III) LLC (the "Company"), a limited liability company formed under the laws of Delaware and I have personal knowledge of the facts certified under my signature and I am duly authorized to certify same.
2. That Company is authorized to file a Renewable Energy Resources Eligibility Form with the State of Rhode Island Public Utilities Commission.
3. That Guy J. Paquette is an authorized representative of the Company and is authorized to execute the Renewable Energy Resources Eligibility Form and is authorized to legally bind the company in like matters.

**IN WITNESS WHEREOF**, I have hereunto signed the present certificate this 17<sup>th</sup> day of December, 2014.



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Janet Shulist

Secretary

KEI (Maine) Power Management (III) LLC



**ATTACHMENT 3**

**Project Description and Capital Investments as Required by C.5 and C.11**

**[REDACTED VERSION]**

### **PROJECT DESCRIPTION**

The Lower Barker Hydroelectric facility has been in operation since 1980 and has a nameplate capacity of 1500 kW. The plant has a single generating unit which is comprised of a retrofit turbine with a capacity range of 400 kW to 1500 kW.

The existing single regulated S-Type turbine at the Lower Barker Hydroelectric facility is oversized and inefficient. The penstock is also restricted with several bends, flow straighteners, section changes and a turbine shut off valve (TSV).

The consequences of an oversized turbine and a restricted penstock are that the site cannot be operated to its optimum capacity. At 100% blade opening, the unit can briefly operate at 1450 kW until the penstock starts to drain. On the lower end of the power curve, the unit cannot operate below 400 kW.

To address the above mentioned deficiencies, a turbine upgrade project is planned for 2015. The project will consist of replacing the existing S-Type single regulated turbine that operates within the range of 140 cfs to 500 cfs with a full Kaplan S-Type turbine operating in the range of 89 cfs to 475 cfs. The operating range of the new turbine will match the hydraulic capacity of the penstock at the upper end of the power curve and, at the lower end of power curve, will allow to harness the energy at the low range of the flow duration curve, thus significantly improving the efficiency of the plant.

The turbine shut off valve will also be removed thus reducing the restriction on the flow of water to the turbine.

The list below summarizes the major work that will be completed to repower the facility.

### **MECHANICAL WORK**

**Turbine:** The existing oversized S-Type turbine will be replaced with a brand new fully regulated Kaplan S-Type turbine rated at 1350 kW and sized to match the hydraulic capacity of the plant. The mechanical work involved will include the replacement of the following:

- **Runner**
- **Runner Hub**
- **Runner Blades**
- **Runner Blade linkage**
- **Runner Blade Servomotor Assembly**
- **Turbine Main Shaft**
- **Stay Ring**
- **Inner Distributor Assembly**

- **Outer Distributor Assembly**
- **Wicket Gates and Linkage**
- **Wicket Gates Servomotor**
- **Guide Bearing**
- **Thrust Bearing**
- **Main Shaft Seal**
- **Throat Ring**
- **Hydraulic Power Unit (HPU)**
- **Instrumentation**

The picture below illustrates the layout of an S-Type Kaplan turbine very similar to what will be installed at the Lower Barker Hydroelectric Facility.

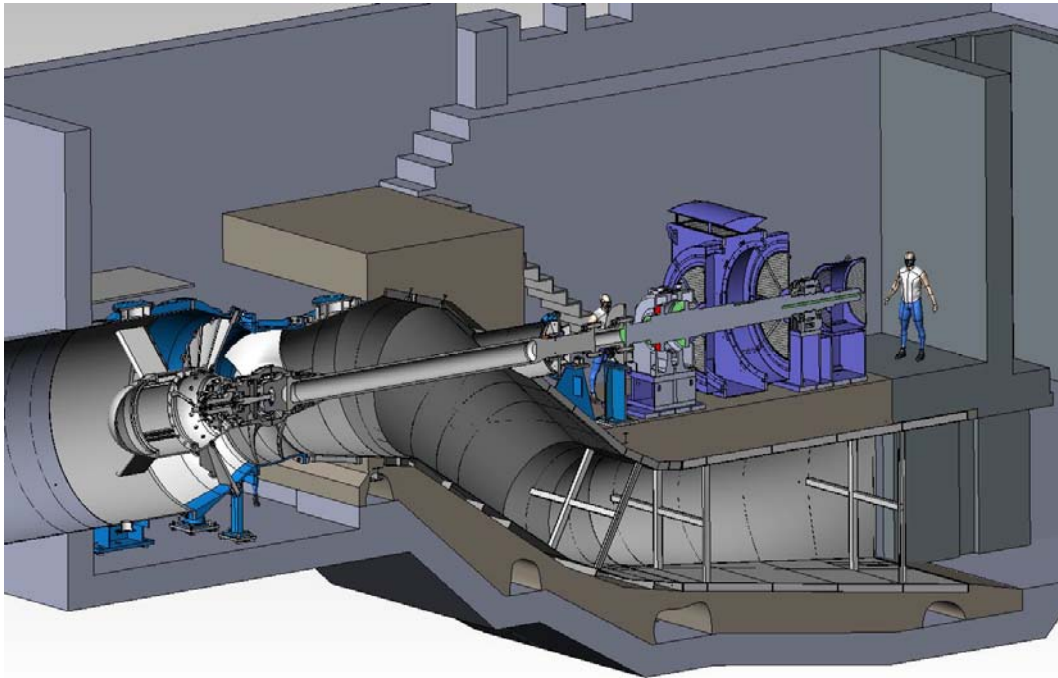


Figure 1: Model of a full Kaplan double Regulated Horizontal S-Type Turbine

**Penstock:** To reduce existing restrictions, the turbine shut off valve (TSV) at the exit of the penstock will be removed. This will allow a gain, on average, of at least 1 foot of head.

- **TSV Removal**  
With the installation of a fully regulated wicket gate system in place of the current guide vanes, the TSV will no longer be needed to slow down the turbine in case of over speed or for dewatering purposes.

### **CIVIL WORK**

- **Concrete removal in powerhouse**  
39 Cubic yards of concrete will be removed to make space for the new turbine's outer distributor assembly and wicket gate linkage mechanism.
- **Rock removal**  
50.7 cubic yards of rock will be removed below the current draft tube and turbine case to accommodate the new wicket gate linkage servomotor unit.
- **Concrete**  
69.7 cubic yards of new concrete will be poured in place to support the new equipment.
- **Miscellaneous**  
Stairs and handrails will be moved and re-installed in order to accommodate and to access the new turbine. Some additional structural work will be done for grating.

### **ELECTRICAL WORK**

- **Automation Upgrade**  
Installation of a control platform that provides complete monitoring and control of all generating equipment, water levels & flows, temperatures and electrical metering. The integrated system will perform the following functions:
  - Automatic Unit Stop
  - Status Monitoring & Alarm Response
  - Automatic Water Level Management
  - Automatic Flow Management
  - Resource Monitoring & Data Recording

### **INVESTMENT AND BOOK VALUE OF THE FACILITY**

The capital investments required by the project are presented in the following table. They total an amount of **[REDACTED]**.

## Capital Investments Required

Description	Details	Cost
Mechanical	[REDACTED]	[REDACTED]
Electrical	[REDACTED]	[REDACTED]
Civil	[REDACTED]	[REDACTED]
Other	[REDACTED]	[REDACTED]
<b>Grand Total for Turbine Upgrade</b>		<b>[REDACTED]</b>

In order to determine the percentage of investments as compared to the value of the facility, the 2013 book value of the Lower Barker facility was compared to the estimated cost of the upcoming project, all of which are summarized in the table below.

Item	Cost
Book value in 2013	[REDACTED]
Total Investments (\$)	[REDACTED]
% Invested	[REDACTED]

The above table shows that the planned investments amount of [REDACTED] will represent [REDACTED] of the value of generating equipment at the site including the land and the dam which was estimated at [REDACTED] in 2013.

**ATTACHMENT 4**

**Determination of Incremental Production as Required by C.11 and C.12**



## KEI (Maine) POWER MANAGEMENT (III) LLC

### INTRODUCTION

The increase in efficiency resulting from installation of the new turbine is calculated using the approach described below.

Data are available for the historical production with the existing turbine in the form of monthly totals for the period 1993 to 2013 with the exception of 1996 where no data could be retrieved (see Table 1).

Historical - Production (MWh)												
Month	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
1993	327	192	379	774	727	408	0	0	0	21	279	895
1994	619	298	688	837	909	381	82	28	135	173	249	580
1995	710	485	773	885	791	401	19	2	0	242	799	656
1997	796	611	839	852	843	435	215	10	76	41	664	265
1998	351	483	887	841	754	525	610	13	0	459	503	574
1999	653	784	840	755	616	81	0	0	54	601	767	594
2000	466	358	842	776	819	443	149	149	0	27	284	448
2001	400	301	522	790	634	518	133	0	0	0	13	52
2002	67	353	814	850	862	682	148	0	5	38	281	333
2003	248	184	344	599	633	371	2	80	65	89	0	409
2004	491	186	605	714	800	298	73	114	52	51	155	823
2005	663	408	743	635	734	688	156	49	87	550	680	762
2006	807	687	593	781	835	694	144	0	0	316	794	902
2007	711	291	654	756	753	459	8	0	0	41	659	643
2008	790	762	697	718	698	458	366	767	501	507	555	586
2009	644	392	609	716	676	525	778	713	84	0	0	33
2010	219	540	657	638	485	172	133	0	0	282	244	363
2011	514	392	709	688	834	254	0	0	0	43	447	710
2012	201	0	0	0	0	0	1131	0	102	316	924	875
2013	835	929	1045	1125	913	943	1078	372	795	113	235	470

Table 1

### PRODUCTION CALCULATION

1. The daily flow data from USGS gage #01057000 on the Little Androscoggin river was used and prorated to the Lower Barker dam as per the following formula:

$$Fd = Fg \times \left(\frac{Ad}{Ag}\right)^m \quad (1)$$

## **KEI (Maine) POWER MANAGEMENT (III) LLC**

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Where,

*F<sub>d</sub>* = Average daily flow at the dam in cfs

*F<sub>g</sub>* = Average daily flow at the gage (USGS) in cfs

*A<sub>d</sub>* = Dam area of 354 square miles

*A<sub>g</sub>* = Gage area of 73.5 square miles

*m* = Parametric Exponent with a value of 0.666 which is determined in the manner presented in paragraphs 2 and 3 below

2. In order to determine the value of the Parametric Exponent *m* in eq. (1), it is necessary to calculate the theoretical daily production with the existing turbine using the formula below:

$$P = \frac{Q \times H_{net} \times Eff \times T}{11.8} \quad (2)$$

Where,

*P* = Quantity of energy for a given day in MWh

*Q* = Average turbine flow for the given day in cfs

*H<sub>net</sub>* = Net Head (Avg gross head – Avg head losses) in ft

*Eff* = Efficiency (turbine efficiency × generator efficiency  
× (1 – %transformer losses) × (1 – %downtime))

*Turbine Efficiency* = 82% for existing turbine

*Generator Efficiency* = 93.4%

*Transformer Losses* = 1.5%

*Downtime* = 5%

*T* = 24 h

In these calculations, if the average daily flow is greater than the existing turbine maximum design flow of 500 cfs, then the daily flow is replaced by the turbine maximum design flow. Conversely, if the average daily flow is smaller than the existing turbine minimum design flow of 140 cfs, then the daily flow is replaced by zero.

3. The value of the Parametric Exponent *m* in equation (1) is then determined in the following manner. For different values of *m*, the average for the yearly production using the theoretical formulas (1) and (2) over the period 1993-2013 is compared with the average for the yearly historical production over the same period. The value retained for the Parametric Exponent *m* is the one where the value of the



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average production calculated with formulas (1) and (2) falls within 1% of the value of the average historical production. This value is equal to 0.666.

The monthly values of the theoretical production using formulas (1) and (2) for the existing turbine are given in Table 2. This is referred to as the baseline data.

Baseline - Production (MWh)												
Month	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
1993	96	0	140	990	576	272	0	0	0	12	261	772
1994	79	189	551	990	895	185	10	11	59	0	167	357
1995	474	57	717	761	640	242	0	0	0	264	904	352
1997	380	149	422	990	838	316	274	57	113	22	617	130
1998	221	364	945	926	570	594	517	0	0	355	380	266
1999	436	514	972	719	496	0	0	14	441	486	644	484
2000	183	89	926	975	879	183	192	71	0	36	322	408
2001	75	0	144	860	564	400	227	0	0	0	49	69
2002	0	235	828	975	788	605	98	0	0	10	219	74
2003	0	0	346	910	720	233	0	107	122	680	918	945
2004	462	0	528	940	698	131	270	244	62	101	324	760
2005	422	235	257	990	1 001	743	106	0	39	743	961	738
2006	865	542	364	710	792	786	550	227	0	593	962	827
2007	448	0	474	958	703	334	10	0	0	156	751	531
2008	650	592	855	985	577	461	344	675	368	600	857	976
2009	464	361	818	968	626	696	893	747	106	567	763	782
2010	646	477	1 023	966	555	320	43	39	0	444	722	790
2011	368	39	811	990	903	146	0	190	278	720	707	800
2012	361	264	790	445	819	789	120	274	266	648	552	653
2013	405	454	705	926	692	630	807	514	551	63	311	244

Table 2

4. Once the value of the Parametric Exponent  $m$  has been determined, the anticipated production from the new turbine is calculated using equation (2) where the data for the new turbine are:

*Turbine Efficiency = 91%*

*Minimum Design Flow = 89 cfs*

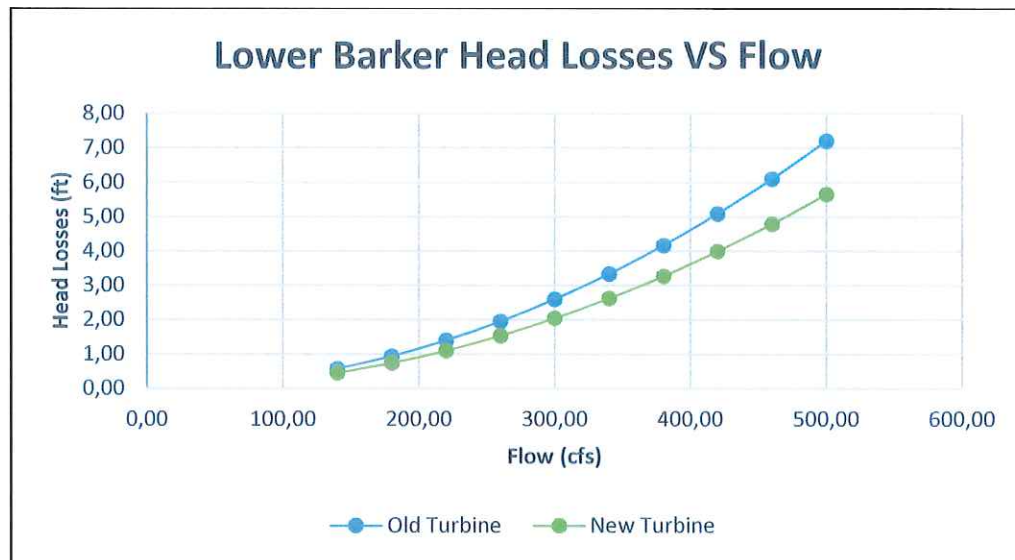
*Maximum Design Flow = 475 cfs*

It is worth mentioning that in the latter calculation, the average head losses were not changed with the new set up, even though the removal of the Turbine shut off

## KEI (Maine) POWER MANAGEMENT (III) LLC

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valve (TSV) is anticipated to reduce the average head losses as depicted in the graph below which compares the theoretical head losses for both turbines.



The monthly average of the anticipated production from the new turbine is presented in Table 3.



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Proposed New Turbine - Production (MWh)												
Month	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
1993	171	0	159	1 052	660	359	0	0	0	32	385	841
1994	312	326	623	1 052	969	287	26	12	104	0	238	517
1995	585	246	831	839	723	297	7	0	0	300	977	424
1997	445	314	489	1 052	910	427	310	83	143	72	686	266
1998	384	492	1 018	999	661	668	590	0	0	441	451	392
1999	577	573	1 047	782	586	46	32	25	487	564	709	578
2000	332	273	1 003	1 042	960	258	246	153	0	47	437	505
2001	261	153	259	923	663	487	305	0	0	0	122	167
2002	55	311	903	1 042	858	678	125	0	0	19	315	165
2003	0	0	384	984	791	306	10	135	153	785	991	1 015
2004	570	229	598	1 010	764	172	341	319	107	150	471	832
2005	510	355	449	1 052	1 072	808	169	0	50	795	1 028	804
2006	937	621	460	781	858	853	659	325	0	636	1 035	906
2007	558	50	568	1 027	795	407	35	0	0	225	834	586
2008	715	657	935	1 048	668	556	394	753	424	653	925	1 050
2009	519	403	894	1 035	728	779	963	832	151	651	827	849
2010	712	528	1 087	1 034	634	406	89	50	0	548	786	863
2011	452	260	913	1 052	975	265	48	236	382	787	778	873
2012	505	344	857	556	889	863	151	340	335	716	639	734

Table 3

### CALCULATION OF THE INCREMENTAL PRODUCTION

1. Using the monthly flow rate in cubic feet per second (cfs) calculated as per equation (1) and presented in Table 4 and the monthly production in MWh, a monthly ratio of production versus flow was calculated for the baseline data, the theoretical production of the new turbine and the historical production. The results are presented in Tables 5, 6 and 7 respectively.

$$\frac{MWh}{cfs} = \frac{\text{monthly production}}{\text{monthly flow rate}} \quad (3)$$

To calculate the ratio in equation (3), the following condition was considered: if the monthly average flow was less than the turbine minimum design flow of 140 cfs for the existing turbine and 89 cfs for the proposed new turbine, the ratio was replaced by 0 (the same was applied to the historical data). And if the monthly

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average flow was greater than the turbine maximum design flow of 500 cfs for the existing turbine and 475 cfs for the new turbine, the ratio was computed using the turbine maximum design flow. The same was applied to the historical data using a maximum design flow of 500 cfs and a minimum design flow of 140 cfs.

Monthly Flow Rate (cfs)												
Month	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
1993	129	67	294	2 003	311	195	23	19	16	65	272	526
1994	156	177	327	1 770	562	160	66	41	69	50	155	278
1995	393	142	558	420	392	165	28	11	4	362	839	205
1997	215	172	246	1 451	510	230	195	65	111	79	513	152
1998	188	317	1 216	864	505	1 309	340	46	20	327	272	191
1999	343	300	1 188	642	290	68	50	48	585	341	406	273
2000	173	156	891	1 243	628	159	152	115	28	68	234	434
2001	140	116	152	1 667	360	385	167	11	18	30	103	132
2002	87	191	529	1 171	583	528	111	16	8	50	177	121
2003	77	62	456	625	399	174	34	105	110	730	756	1 337
2004	281	127	336	916	399	132	195	177	104	114	407	614
2005	246	192	286	2 483	1 138	698	112	25	60	1 064	916	554
2006	777	510	258	419	804	668	366	183	63	750	965	511
2007	291	107	390	1 788	448	319	68	30	30	132	603	324
2008	379	339	546	2 042	487	289	337	853	355	438	938	812
2009	247	215	559	1 277	364	924	938	566	125	397	691	615
2010	518	416	1 571	875	332	225	99	60	38	305	546	902
2011	217	146	943	1 682	705	156	70	323	223	489	526	575
2012	243	181	575	391	510	1 237	120	230	221	525	366	534
2013	258	313	555	873	619	453	734	439	460			

Table 1



## KEI (Maine) POWER MANAGEMENT (III) LLC

Baseline - Production/Flow (MWh/ cfs)												
Month	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
1993	0,00	0,00	0,48	1,98	1,85	1,39	0,00	0,00	0,00	0,00	0,96	1,54
1994	0,50	1,07	1,68	1,98	1,79	1,16	0,00	0,00	0,00	0,00	1,07	1,28
1995	1,21	0,40	1,43	1,81	1,63	1,47	0,00	0,00	0,00	0,73	1,81	1,72
1997	1,77	0,87	1,71	1,98	1,68	1,37	1,40	0,00	0,00	0,00	1,23	0,86
1998	1,17	1,15	1,89	1,85	1,14	1,19	1,52	0,00	0,00	1,09	1,40	1,39
1999	1,27	1,72	1,94	1,44	1,71	0,00	0,00	0,00	0,88	1,43	1,59	1,77
2000	1,06	0,57	1,85	1,95	1,76	1,15	1,26	0,00	0,00	0,00	1,38	0,94
2001	0,00	0,00	0,95	1,72	1,56	1,04	1,36	0,00	0,00	0,00	0,00	0,00
2002	0,00	1,23	1,66	1,95	1,58	1,21	0,00	0,00	0,00	0,00	1,24	0,00
2003	0,00	0,00	0,76	1,82	1,80	1,34	0,00	0,00	0,00	1,36	1,84	1,89
2004	1,64	0,00	1,57	1,88	1,75	0,00	1,38	1,38	0,00	0,00	0,80	1,52
2005	1,71	1,23	0,90	1,98	2,00	1,49	0,00	0,00	0,00	1,49	1,92	1,48
2006	1,73	1,08	1,41	1,69	1,58	1,57	1,50	1,25	0,00	1,19	1,92	1,65
2007	1,54	0,00	1,22	1,92	1,57	1,05	0,00	0,00	0,00	0,00	1,50	1,64
2008	1,72	1,75	1,71	1,97	1,18	1,59	1,02	1,35	1,04	1,37	1,71	1,95
2009	1,88	1,68	1,64	1,94	1,72	1,39	1,79	1,49	0,00	1,43	1,53	1,56
2010	1,29	1,15	2,05	1,93	1,67	1,42	0,00	0,00	0,00	1,46	1,44	1,58
2011	1,69	0,26	1,62	1,98	1,81	0,94	0,00	0,59	1,24	1,47	1,41	1,60
2012	1,49	1,46	1,58	1,14	1,64	1,58	0,00	1,19	1,20	1,30	1,51	1,31
2013	1,57	1,45	1,41	1,85	1,38	1,39	1,61	1,17	1,20			

Table 2

## KEI (Maine) POWER MANAGEMENT (III) LLC

Proposed New Turbine - Production/Flow (MWh/ cfs)												
Month	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
1993	1,32	0,00	0,54	2,22	2,12	1,84	0,00	0,00	0,00	0,00	1,42	1,77
1994	2,00	1,83	1,90	2,22	2,04	1,79	0,00	0,00	0,00	0,00	1,53	1,86
1995	1,49	1,73	1,75	2,00	1,84	1,80	0,00	0,00	0,00	0,83	2,06	2,07
1997	2,07	1,83	1,98	2,22	1,92	1,86	1,59	0,00	1,28	0,00	1,44	1,75
1998	2,04	1,55	2,14	2,10	1,39	1,41	1,73	0,00	0,00	1,35	1,66	2,05
1999	1,68	1,91	2,20	1,65	2,02	0,00	0,00	0,00	1,02	1,65	1,75	2,12
2000	1,92	1,75	2,11	2,19	2,02	1,62	1,63	1,32	0,00	0,00	1,87	1,16
2001	1,87	1,33	1,70	1,94	1,84	1,26	1,83	0,00	0,00	0,00	1,18	1,26
2002	0,00	1,63	1,90	2,19	1,81	1,43	1,12	0,00	0,00	0,00	1,78	1,36
2003	0,00	0,00	0,84	2,07	1,98	1,76	0,00	1,28	1,40	1,65	2,09	2,14
2004	2,02	1,80	1,78	2,13	1,92	1,31	1,74	1,80	1,04	1,31	1,16	1,75
2005	2,07	1,85	1,57	2,22	2,26	1,70	1,50	0,00	0,00	1,67	2,16	1,69
2006	1,97	1,31	1,78	1,86	1,81	1,80	1,80	1,78	0,00	1,34	2,18	1,91
2007	1,91	0,47	1,46	2,16	1,77	1,27	0,00	0,00	0,00	1,71	1,76	1,81
2008	1,89	1,94	1,97	2,21	1,41	1,92	1,17	1,58	1,19	1,49	1,95	2,21
2009	2,10	1,88	1,88	2,18	2,00	1,64	2,03	1,75	1,21	1,64	1,74	1,79
2010	1,50	1,27	2,29	2,18	1,91	1,80	0,89	0,00	0,00	1,80	1,65	1,82
2011	2,08	1,78	1,92	2,22	2,05	1,70	0,00	0,73	1,71	1,66	1,64	1,84
2012	2,08	1,91	1,80	1,42	1,87	1,82	1,26	1,48	1,52	1,51	1,75	1,54
2013	1,96	1,60	1,62	2,09	1,58	1,56	1,84	1,34	1,39			

Table 3



## KEI (Maine) POWER MANAGEMENT (III) LLC

Historical - Production/Flow (MWh/ cfs)												
Month	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
1993	0,00	0,00	1,29	1,55	2,34	2,09	0,00	0,00	0,00	0,00	1,03	1,79
1994	3,96	1,68	2,10	1,67	1,82	2,38	0,00	0,00	0,00	0,00	1,60	2,09
1995	1,81	3,41	1,55	2,11	2,02	2,43	0,00	0,00	0,00	0,67	1,60	3,20
1997	3,71	3,55	3,40	1,70	1,69	1,89	1,10	0,00	0,00	0,00	1,33	1,75
1998	1,87	1,53	1,77	1,68	1,51	1,05	1,79	0,00	0,00	1,40	1,85	3,00
1999	1,90	2,62	1,68	1,51	2,12	0,00	0,00	0,00	0,11	1,76	1,89	2,18
2000	2,69	2,29	1,68	1,55	1,64	2,79	0,99	0,00	0,00	0,00	1,22	1,03
2001	0,00	0,00	3,42	1,58	1,76	1,34	0,80	0,00	0,00	0,00	0,00	0,00
2002	0,00	1,85	1,63	1,70	1,72	1,36	0,00	0,00	0,00	0,00	1,58	0,00
2003	0,00	0,00	0,75	1,20	1,59	2,13	0,00	0,00	0,00	0,18	0,00	0,82
2004	1,75	0,00	1,80	1,43	2,01	0,00	0,37	0,64	0,00	0,00	0,38	1,65
2005	2,69	2,12	2,60	1,27	1,47	1,38	0,00	0,00	0,00	1,10	1,36	1,52
2006	1,61	1,37	2,30	1,86	1,67	1,39	0,39	0,00	0,00	0,63	1,59	1,80
2007	2,44	0,00	1,68	1,51	1,68	1,44	0,00	0,00	0,00	0,00	1,32	1,99
2008	2,08	2,25	1,39	1,44	1,43	1,59	1,08	1,53	1,41	1,16	1,11	1,17
2009	2,61	1,82	1,22	1,43	1,86	1,05	1,56	1,43	0,00	0,00	0,00	0,07
2010	0,44	1,30	1,31	1,28	1,46	0,76	0,00	0,00	0,00	0,92	0,49	0,73
2011	2,36	2,69	1,42	1,38	1,67	1,63	0,00	0,00	0,00	0,09	0,89	1,42
2012	0,83	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,46	0,63	2,53	1,75
2013	3,24	2,97	2,09	2,25	1,83	2,08	2,16	0,85	1,73			

Table 4

2. For each month of the year, the average over the observed period of the MWh/cfs was calculated for the following scenarios:
  - a. Existing turbine theoretical production (Baseline)
  - b. Proposed new turbine theoretical production (Proposed New Turbine)
  - c. Existing turbine historical production (Historical)

The results are compiled in Table 8.

Average Monthly Production/Flow (MWh/cfs)													
Month	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Average
Baseline	1,16	0,85	1,47	1,84	1,64	1,19	0,64	0,42	0,28	0,75	1,38	1,35	1,08
Proposed New Turbine	1,70	1,47	1,76	2,07	1,88	1,56	1,01	0,65	0,59	1,03	1,72	1,78	1,44
Historical	1,80	1,57	1,75	1,50	1,66	1,44	0,51	0,22	0,19	0,45	1,14	1,47	1,14

Table 5

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3. The percent increase between the existing and the new turbine was calculated from the average monthly flow of the observed period presented in Table 9.

Average Monthly Flow (cfs)												
Month	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
1993-2013	268	212	594	1 230	517	424	210	168	132	332	510	478

Table 6

Using the data of Table 8 and Table 9, the estimated normalized monthly production of each scenario were calculated as follow:

$$\text{Estimated monthly production} = \text{Average monthly ratio} \times \text{Average monthly flow}$$

**Example:** Considering that the average MWh/cfs for January is 1.16 for the Baseline and 1.70 for the proposed new turbine, and that the average flow over the same month is equal to 268 cfs. The average normalized production for January would then be:

- for the Baseline Data

$$1.16 \times 268 = 311 \text{ MWh}$$

- for the Proposed New Turbine

$$1.70 \times 268 = 455 \text{ MWh}$$

The results of all the above are presented in Table 10 below:

Estimated Normalized Production (MWh)													
Month	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Year
Baseline	311	181	736	919	820	503	135	71	37	250	691	647	5 302
Proposed New Turbine	455	311	835	984	892	663	212	110	78	343	819	848	6 551
Historical	482	334	877	752	832	609	108	37	25	150	572	704	5 482

Table 7

Based on the data compiled in Table 10, we can evaluate the increase in efficiency resulting from installation of the new turbine. As shown in Table 11, the anticipated increase in efficiency is equal to 23.6% when compared to the Baseline production. This is a conservative estimate as this figure doesn't take into consideration the



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gains in head losses following the removal of the Turbine Shut off Valve and the operational gains resulting from the added instrumentation, the remote operation of the plant and the automated adjustment of the turbine controls to fluctuating flow conditions.

Scenario	Yearly Production (MWh)		Scenario Comparison	Increase in Efficiency
Baseline	5,302		Proposed New Turbine vs Baseline	23.6 %
Proposed New Turbine	6,551		Proposed New Turbine vs Historical	19.5 %
Historical	5,482		Baseline vs Historical	- 3.3 %

*Table 8*